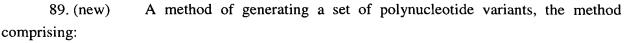progeny of a HMM profile defined shuffling. According to the present invention, oligonucleotides corresponding to these nucleic acids are generated for recombination, gene reconstruction and screening.

IN THE CLAIMS

Please delete pending claims 43-53.

Please add the following add claims.

89. (new)   A method of generating a set of polynucleotide variants, the method comprising:

(a) providing one or more parental character strings representing one or more polynucleotides or polypeptides;

(b) manipulating the one or more parental character strings by applying a genetic operator to computationally generate one or more derivative character strings;

(c) from the one or more derivative character strings, computationally selecting a set of character substrings;

(d) providing a set of oligonucleotides corresponding in sequence to the set of character substrings; and

(e) recombining the set of oligonucleotides *in vitro* to generate a set of polynucleotide variants.

90. (new)   The method of claim 89, further comprising:

identifying one or more frame shift mutations or premature terminations among the derivative character strings; and

removing or repairing derivative character strings possessing the one or more frame shift mutations or premature terminations.

91. (new)   The method of claim 89, wherein the genetic operator is selected from the group consisting of multiplication, mutation, fragmentation, crossover, and ligation.

92. (new)   The method of claim 89, wherein (e) comprises assembling a library of recombinant nucleic acids by assembly PCR from the single-stranded oligonucleotides.

93. (new)   The method of claim 92, further comprising:

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f) selecting or screening the library for one or more recombinant polynucleotide or polypeptide having a desired property.

94. (new) The method of claim 92, further comprising reiterative recombination or selection of the library of recombinant nucleic acids.

95. (new) The method of claim 89, further comprising:

(f) deconvoluting one or more of said set of set of polynucleotide variants to produce one or more variant character strings corresponding to the sequences of the one more polynucleotide variants; and

(g) performing (a)-(e) using the one or more variant character strings as the parental character strings.

96. (new) The method of claim 89, wherein the set of oligonucleotides comprises one or more oligonucleotide member between about 20 and about 60 nucleotides in length.

97. (new) The method of claim 89, wherein the polynucleotide variants are recombinant nucleic acids and wherein (e) comprises assembling a library of the recombinant nucleic acids parallel.

98. (new) The method of claim 89, wherein the polynucleotide variants are recombinant nucleic acids and wherein (e) comprises assembling a library of the recombinant nucleic acids by ligation of the oligonucleotides.

99. (new) A method of identifying a set of oligonucleotides for use in a physical recombination procedure, the method comprising:

(a) providing one or more parental character strings representing one or more polynucleotides or polypeptides;

(b) manipulating the one or more parental character strings by applying a genetic operator to computationally generate one or more derivative character strings; and

(c) from the one or more derivative character strings, computationally selecting a set of character substrings having sequences that identify the set of oligonucleotides for *in vitro* recombination.

100. (new) The method of claim 99, further comprising:

identifying one or more frame shift mutations or premature terminations among the derivative character strings; and

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removing or repairing derivative character strings possessing the one or more frame shift mutations or premature terminations.

101. (new)   The method of claim 99, wherein the genetic operator is selected from the group consisting of multiplication, mutation, fragmentation, crossover, and ligation.

102. (new)   A computer program product comprising a machine readable medium on which is provided program code for identifying a set of oligonucleotides for use in a physical recombination procedure, the program code comprising:

(a) code for providing one or more parental character strings representing one or more polynucleotides or polypeptides;

(b) code for manipulating the one or more parental character strings by applying a genetic operator to generate one or more derivative character strings; and

(c) code for selecting a set of character substrings from the one or more derivative character strings, which character substrings have sequences that identify the set of oligonucleotides for *in vitro* recombination.

103. (new)   The computer program product of claim 102, further comprising:

code for identifying one or more frame shift mutations or premature terminations among the derivative character strings; and

code for removing or repairing derivative character strings possessing the one or more frame shift mutations or premature terminations.

104. (new)   The computer program product of claim 102, wherein the genetic operator is selected from the group consisting of multiplication, mutation, fragmentation, crossover, and ligation.

REMARKS

The undersigned attorney has assumed responsibility for this application. The previously pending claims have been canceled. New claims 89-104 are submitted for consideration. The claims present closely related methods and corresponding computer program products for computationally manipulating character strings that represent potential compositions of matter (polynucleotides and/or polypeptides). The character strings are not themselves compositions of matter.